L4 Modelling Quadratics Using Vertex Form

1) Sketch the parabola, if possible

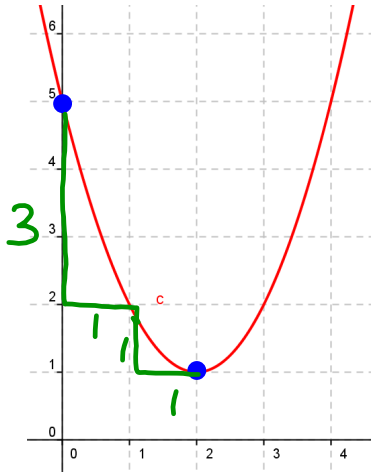
2) Identify the key properties

3) Sub vertex (h, k) into $y = a(x - h)^2 + k$
   - if vertex is not given, use symmetry

4) Sub any other point to find a

5) Does your answer make sense?

Ex.1. Determine the equation in vertex form.



Vertex $(2,1)$

y-intercept $(0,5)$

$y = a(x-h)^2 + k$

$y = a(x-2)^2 + 1$

$5 = a(0-2)^2 + 1$

$\frac{4}{4} = \frac{a(4)}{4}$

$a = 1$

$\therefore$ the equation is $y = (x-2)^2 + 1$

Ex.2 State the equation of the parabola obtained by applying these transformations to the graph of $y = x^2$.
- a vertical stretch by a factor of 5 $a = 5$
- a vertical shift up of 9 units $k = 9$

$$y = a(x-h)^2 + k$$
$$y = 5x^2 + 9$$

Ex.3 Write an equation for the parabola that has a vertex at (-3, 5), no zeros, and is wider than $y = x^2$.

$$y = a(x-h)^2 + k$$
$$y = a(x+3)^2 + 5$$

no zeros

$0 < a < 1$

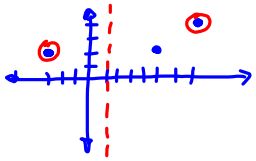
positive (open up)

$y = a(x+3)^2 + 5$

$5 = a(-3+3)^2 + 5$

$5 - 5 = a(0)^2$

Ex.4 Find the equation of the quadratic that passes through the points (-3, 2), (5, 2) and (7, 4).



$AOS = \frac{-3+5}{2}$

$x = 1$

Vertex $(1, -)$

$y = a(x-1)^2 + k$

Sub in $(7,4)$

$4 = a(7-1)^2 + k$

① $4 = 36a + k$

Sub in $(-3,2)$

$2 = a(-3-1)^2 + k$

② $2 = 16a + k$

$4 = 36a + k$

$-\ 2 = 16a + k$

$\frac{2}{20} = \frac{20a}{20}$

$\frac{1}{10} = a$

$a = 0.1$

Assigned Work: p. 280 # 1, 2ace, 3ace, 4, 5ace, 6cd, 7b, 8 (w/ diagram), 10, 15